Deep Site ‘module’ Working Group

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Deep thinking

- Scope: Small/clean, as deep as possible - physics+geo
  - Generic DM, double beta, solar neutrinos
  - Deep biological observatory, deep geological expts (virgin territory)
- Charge
  - For physics, review first approx of requirements
  - Earthlab - generic experiments
  - Sketch scenarios
    - Make physics requirement more precise
    - Time sequences for shared use of development and use of sites
- J. Wilkerson (before departing for a different group) - deep doesn't mean small -- eg, solar neutrino
  - Generic issues -- refer back to Bahcall technical sub-committee report - useful information for planning science

What we want to do…

- Dark Matter (Dan Akerib) - Generically speaking, neutron background - deeper is better… other needs such as clean controlled space.
- Geomicrobiology - exploring the limits of life. (Tom Kieft) - base camp 2500m with deeper bore holes down to 6000 m; ongoing drilling and down-hole monitoring.
- Rock bursts (Eric Weston) - rock bursts, ability to understand seismicity - want to look at spectrum from shallow to deep in same rock.
- Matthias Imhof - fractures, start at surface down to 8 km, investigate rock-cube scale from meter to km, also at a range of depths. Base camp of few hundred m^2 at different depths. (dream lab - can do with less)
- LENS - liquid scintillator for solar neutrinos (Raju Raghavan) - 5000 m^3 in 20x20x20. Deeper the better - at least 1000m, clean but not necessarily ultra clean. Ventilation for safety. Scintillator 'pit' & water shielding.
- Low-energy solar neutrino - Dan McKinsey - 100 tons LNe. ~2000m (6000mwe). Cryopit - 20 m high; ventilation, quench tube --for safety reasons. Control room space. Cleanliness ~class 10000

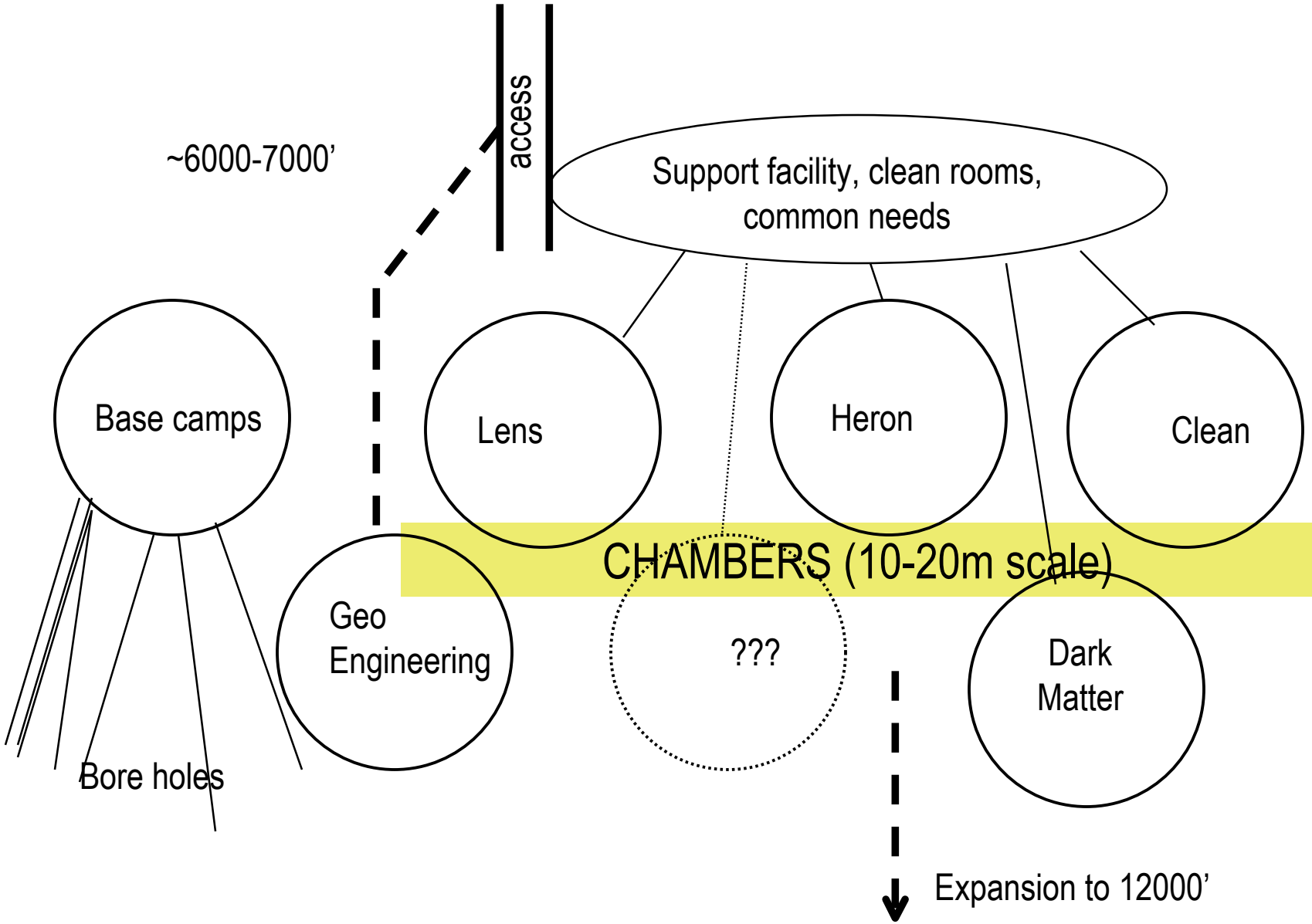
What we want to do…

- Xenon DM - similar depth requirements (cryopit?); water shielding
- Heron - low energy solar neutrinos (Bob Lanou) - 20 ton superfluid Lhe, similar cleanliness requirements to Clean. Minimum depth 1500m but 3000m better - concern is spallation product. Safety issues/ventilation etc for cyrogen safety. Cryopit dimensions similar to Clean.
- Mining engineering (Ugur Ozbay) - rock bursts in deep mines. Interested in the actual excavations for the other projects. Instrument, monitor and model as excavations take place at various levels, and as deep as possible.
- Industrial hygiene and health physics (ILA Pillalamarri). Low background counting of the environment. Particulate matter in the environment during and after the excavations, toxins, radon plate out to be carried out at a range of depths.
- Majorana - (Y. Chan) - 'usual' requirements for depth and shielding and cleanliness, but also detector fabrication - ultimate capability would be zone-refining at depth, and detector handling. If detector transport not a source of contamination, then fab could be at shallow depth (~100m)
- Low background counting (Al Smith) - advertise as multi-purpose user facility, not just to serve the experiments at Dusel - but to serve other needs, eg, homeland security

General considerations

- Ultra Clean enclosures, control of local environment when concerned with radioactive backgrounds
- Common infrastructure/services
  - Cryogen supplies
- Low background counting support facilities (don't need to be deep)
- Low-background storage (what depth?)
- Development capability for ongoing excavations to serve future needs in all disciplines, ie, beyond the first round of excavations. -- We need to design a lab in which the needs for stability and ongoing excavation/inducement of seismic events are both satisfied.
- 12000' expansion capability ~ultimate depth from viewpoint of muon flux
- Timeline - initial phase of excavation would be utilized 'immediately' by geo/bio sciences, in parallel with detector development for the physics labs.

connections



roadmaps

- Read my roadmap